Weinberg, Steven

Cosmology. (English) Zbl 1147.83002

Oxford: Oxford University Press (ISBN 978-0-19-852682-7/hbk). xvii, 593 p. (2008).

Few months after its appearance, at least five enthusiastic book reviews appeared for this new book by Nobel laureate Steven Weinberg, which has the power to become a classic textbook about cosmology.

If an author writes another book with a quite similar title as the previous one, then usually, there is much overlap between them. This is, however, not the case with the present book, entitled "Cosmology", by Steven Weinberg: His previous book, "Gravitation and Cosmology", was published in 1972, and now, 36 years later, he wrote a complete new book on Cosmology.

References are given, in an unusual way, as footnotes to the pages where they are mentioned; fortunately, the author index is carefully managed, so one can find the cited literature also this way. A next unusual feature of this book is the publication of an online available list of corrections, see http://zippy.ph.utexas.edu/~weinberg/corrections.html which today (September 3, 2008) contains already 21 items like "In footnote 2 on p. 1, '300 light years' should be '300 million light years'. (Thanks to F. Maienschein for this correction.)"

The book is divided into 10 chapters, starting with Chapter 1: The expansion of the universe, Chapter 2: The cosmic microwave background, via inflation, ..., Chapter 5: General theory of small fluctuations, Chapter 6: Evolution of cosmological fluctuations, growth of structure, then to Chapter 9: Gravitational lenses, which contains also a section about cosmic strings. It mentions a new interpretation of an earlier observation: in 2003, there was found a plausible candidate for lensing by a cosmic string; however, this interpretation had to be abandoned in 2006, so now one has no more any candidate for the existence of a cosmic string.

Every topic is clearly developed on the ground of general relativity theory. The appendices list several useful mathematical background and astrophysical data: Review of General Relativity, Ergodic theorem, Newtonian cosmology, and the relativistic Boltzmann equation. A list of problems, and author and subject index close this really important book.

Reviewer: Hans-Jürgen Schmidt (Potsdam)

MSC:

83-01	Introductory exposition (textbooks, tutorial papers, etc.) pertaining to relativity and gravitational theory
85-01	Introductory exposition (textbooks, tutorial papers, etc.) pertaining to astronomy and astrophysics
83F05	Cosmology
85A40	Cosmology
83C10	Equations of motion in general relativity and gravitational theory
85A05	Galactic and stellar dynamics
85A25	Radiative transfer in astronomy and astrophysics
83C55	Macroscopic interaction of the gravitational field with matter (hydrodynamics, etc.)
83C25	Approximation procedures, weak fields in general relativity and gravitational theory
85A35	Statistical astronomy
76P05	Rarefied gas flows, Boltzmann equation in fluid mechanics

Keywords:

homogeneous average universe; gravitational lensing; structure formation; Boltzmann equation